REMARKS

Claims 17, 18, 22-31 are pending in the above application.

Claims 17, 18, 22-23 stand rejected under 35 U.S.C. §102(b) as being anticipated by Yamada (U.S. Patent No. 4,427,482) or Pollet (U.S. Patent No. 5,024,890) or Dunbar (U.S. Patent No. 4,898,770). The Examiner first notes in making this rejection that Yamada, Pollet and Dunbar each teach string binders and preforms and molded articles formed therefrom, as required by claims 17-18 and 22-23. The Examiner then notes that claims 17, 18, 22, and 23 are product-by-process claims, with patentability resting solely in the product, and are rejected in the absence of clear factual evidence to the contrary of unexpected or superior properties related to the process and/or product.

The Examiner also notes that claims 17, 18, 22-31 stand rejected under 35 U.S.C. §102(b) as being anticipated by Woodside (U.S. Patent No. 5,972,503). The Examiner first notes in making this rejection that Woodside teaches a string binder, preform and composite molded article formed therefrom as required by claims 17-18 and 22-23, said composite molded article having the matrix material of the type contemplated by claims 24-25, and that the rovings can be chopped into pellets, as required by claims 27 and 30, wherein the chopped pellets have a length within the range set forth in claims 28 and 31. The Examiner also notes that Woodside teaches roving comprising reinforcing fibers and string binders the fibrous carrier strand could be a chopped roving within the range contemplated by Applicants in claims 28 and 31. Finally, the Examiner notes that claims 17, 18, 22-31 are product-by-process claims, with patentability resting solely in the product, and are rejected in the absence of clear factual evidence to the contrary of unexpected or superior properties related to the process and/or product.

Applicants have first modified claims 17, 18, 22, 23, 26 and 29 to now describe product claims, not product by process claims, in response to the Examiner's notes in paragraphs 2 and 3 of the Office Action. Thus, modified claim 17 discloses a string binder that incorporates the subject matter of previously cancelled claim 1, while

modified claim 18 discloses a string binder that incorporates the subject matter of previously cancelled claim 9. Similarly, modified claim 22 now discloses a preform that incorporates the subject matter of previously cancelled claim 19. Also, modified claim 23 discloses a composite article having a moldable matrix polymer material and the preform as described in amended claim 22. Further, modified claim 26 discloses a multi-end roving consisting of one or more strands of reinforcing material and the string binder described in amended claim 17. Finally, modified claim 29 discloses a multi-end roving consisting of one or more strands of reinforcing material and the string binder described in amended claim 18. Applicants respectfully submit that amended claims 17, 18, 22, 23, 26 and 29 are in proper form as product claims. Reconsideration of amended claims 17, 18, 22, 23, 26 and 29 is respectfully requested.

Regarding the Examiner's rejection of claims 17, 18, 22-23 stand rejected under 35 U.S.C. §102(b) as being anticipated by Yamada (U.S. Patent No. 4,427,482) or Pollet (U.S. Patent No. 5,024,890) or Dunbar (U.S. Patent No. 4,898,770), Applicants respectfully traverse the Examiner's rejection.

Yamada discloses a method for producing prepreg rovings that are used to form composite articles. In this process, the prepreg is made by first adding a predetermined amount of the resin binder forming material which may include a predetermined amount of filler, catalyst and/or other materials, and applying the formulation to a fibrous material.

The present invention, as claimed in amended claims 17 and 18, comprises a string binder, not a prepreg roving. As one of ordinary skill appreciates, a prepreg roving can be molded into a composite article in a single step, while a string binder cannot. Instead, as shown in amended claim 22 and described in the specification, the string binder is first chopped and fused to form a preform. The preform is then placed into a mold, injected with a moldable matrix polymer material, and molded to form a composite article, as described in claim 23. Because Yamada does not describe string binder made in accordance with amended claims 17 or 18 and further processed to form

a preform as in claim 22 or a composite article as in claim 23, Yamada cannot anticipate claims 17, 18, 22 and 23. Reconsideration of claims 17, 18, 22 and 23 is thus respectfully requested.

Pollet discloses a method for impregnating glass fibers which a slurry composition that includes a thermoplastic resin, a coupling agent such as a catalyst, a binder or film former, and a thickening agent. The thermoplastic resins are dispersed in a sizing composition (solvent based) in the form of fine particles. As described in column 1 beginning at line 60, the slurry composition is applied to the surface of the yarn or strand. The resulting strands can be chopped and used for such operations as injection molding.

The present invention, as claimed in claims 17, 18, and 22-31, all require the formation of a string binder having at least one layer of catalyst composition applied prior to after the introduction of a solvent-free binder resin composition. As described in the present application on page 30, beginning at line 4:

> "Where the catalyst composition is applied as a separate layer in the form of a pre-coating or post-coating, it has been found that the adhesion of both the catalyst composition and the binder resin composition to the surfaces of the fibrous carrier substrate is improved. In both respects, the presence of the carrier material in combination with the catalyst improves coating ability of the catalyst composition, and as a result flaking and peeling of the dried catalyst composition and binder resin composition from the surfaces of the fibrous carrier substrate is reduced by as much as about 93%."

Therefore, Pollet does not describe a string binder as defined in the present invention in claims 17 and 18. The catalyst layer in Pollet is not applied as a precoat or postcoat layer. Further, Pollet does not describe a thermoplastic resin that is solvent free and having an acid value of less than 30 mg KOH/g of resin. Reconsideration of claims 17 and 18 is respectfully requested.

Further, Pollet does not describe a preform made from a string binder having a catalyst applied as a post-coat as in claim 22. Also, Pollet does not describe a composite article formed from the preform in claim 22 as in claim 23. Reconsideration of claims 22 and 23 is thus respectfully requested.

Dunbar teaches a process for producing a preformable continuous mat having a thermosetting polyester resin and thermoplastic polyester resin. The mat is heated such that the thermosetting binder resin cures and hardens while the thermoplastic resin flows around strand intersections.

Claims 17 and 18 of the present invention are distinguished from the Dunbar reference because each claim recites the use of a string binder, while the Dunbar reference discloses a preform mat structure. As discussed above, a string binder is not a preform mat structure.

Claim 22 is distinguished because the preform of Dunbar requires both a thermoplastic and thermosetting polyester resin, while the preform of claim 22 only utilizes a thermoformable (i.e. thermoplastic) liquid binder resin having an acid value of 30 mg KOH/g. Further, Dunbar does not describe the step of applying a catalyst composition as a pre-coating layer as is claimed in amended claim 22 of the present invention. Also, claim 22 requires the formation of a string binder that is used to form the preform structure, which the Dunbar reference does not utilize.

Claim 23 discloses a composite structure made of a preform that is formed by fusing together multiples strands of a string binder material. Dunbar does not utilize a string binder material. Further, Dunbar does not describe the step of applying a catalyst composition as a pre-coating layer as is claimed in amended claim 23 of the present invention.

Claims 17, 18, and 22-23 are therefore novel over the Dunbar reference. Reconsideration of claims 17, 18, and 22-23 is respectfully requested.

Thus, Applicants respectfully submit that Yamada, Pollet, or Dunbar does not anticipate amended claims 17, 18, 22 and 23. Reconsideration of claims 17, 18, 22 and 23 is respectfully requested.

Claims 17, 18, 22-31 stand rejected under 35 U.S.C. §102(b) as being anticipated by Woodside (U.S. Patent No. 5,972,503). Applicants respectfully traverse the Examiner's rejection. Contrary to the Examiner's analysis, Woodside does not describe a string binder material, but instead describes a prepreg material. For reasons set forth above, a string binder is not equivalent to a prepreg material. Further, the prepreg material in Woodside is not formed by introducing a catalyst composition as a pre-coating or post-coating.

For reasons thus set forth fully above with respect to Yamada, Pollet, and Dunbar, Applicants respectfully suggest that the prepreg material described in Woodside is not the equivalent of the string binders as set forth in amended claims 17 and18. Further, because of this fact, the proposed preform of Woodside is not the equivalent of the preform of amended claim 22. Also, the proposed composite structure of Woodside is not equivalent to the composite structure of claims 23-25. Finally, the proposed multi-end roving material is not the same as the multi-end roving materials of claims 26-31. Thus, Applicants respectfully submit that claims 17, 18, and 22-31 are not anticipated by Woodside because Woodside does not describe a string binder made with either a pre-coat or post-coat of catalyst composition as in the presently claimed invention. Reconsideration of claims 17, 18, and 22-31 is thus respectfully requested.

In view of the foregoing amendments and remarks, Applicants submit that claims 17, 18, 22-31 are allowable. The Examiner is invited to telephone the Applicants' undersigned attorney at (614) 321-7162 if any unresolved matters remain.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claim 17, 18, 22, 23, 26 and 29 as follows:

17. (Amended) A string binder [formed according to the process of claim 1] comprising:

at least one strand of a fibrous carrier substrate;

at least one layer of a pre-coating of a catalyst composition applied to a surface of each of said at least one strand of said fibrous carrier substrate, said catalyst composition comprising an effective amount of a catalyst having a high activation temperature; and

at least one layer of a solvent-free binder resin composition applied to an outer layer of said at least one layer of said pre-coating, said solvent-free binder resin composition comprising a thermoformable liquid binder resin material having an acid value of less than about 30 mg KOH/g of resin.

18. (Amended) A string binder [formed according to the process of claim 9] comprising:

at least one strand of a fibrous carrier substrate;

at least one layer of a solvent-free binder resin composition applied to a each of said at least one strand of said fibrous carrier substrate, said solvent-free resin composition comprising a thermoformable liquid binder resin material having an acid value of less than about 30 mg KOH/g of resin; and

at least one layer of a post-coating of a catalyst composition applied to said outer one of said at least one layer of said solvent-free binder resin composition, said

catalyst composition comprising an effective amount of a catalyst having a high activation temperature.

22. (Amended) A preform [manufactured according to the process of claim 19] comprising:

at least one strand of a fibrous carrier substrate;

at least one layer of a pre-coating applied to a surface of each of said at least one strand of said fibrous carrier substrate comprising a catalyst composition, said catalyst composition comprising an effective amount of a catalyst having a high activation temperature;

at least one layer of a solvent-free binder resin composition applied to an outer layer of said at least one layer of said pre-coating said solvent-free binder resin composition comprising a thermoformable liquid binder resin material having an acid value of less than about 30 mg KOH/g of resin; and

wherein a portion of at least one layer of said solvent binder of at least one of said plurality of string binder fuses within adjacent one of said at least one layer of another one of said plurality of said string binders.

23. (Amended) A molded composite article comprising:

(a) a moldable matrix polymer material; and

(b) a preform comprising:

at least one strand of a fibrous carrier substrate;

at least one layer of a pre-coating applied to a surface of each of said at least one strand of said fibrous carrier substrate comprising a catalyst composition, said catalyst composition comprising an effective amount of a catalyst

having a high activation temperature;

at least one layer of a solvent-free binder resin composition applied to an outer layer of said at least one layer of said pre-coating said solvent-free binder resin composition comprising a thermoformable liquid binder resin material having an acid value of less than about 30 mg KOH/g of resin; and

wherein a portion of at least one layer of said solvent binder of at least one of said plurality of string binder fuses within adjacent one of said at least one layer of another one of said plurality of said string binders [the preform of claim 22].

26. (Amended) A multi-end roving comprising:

a) one or more strands of a reinforcing fiber material; and

b) one or more strands of a string binder [prepared according to the method of claim 1], said string binder comprising:

at least one strand of a fibrous carrier substrate;

at least one layer of a pre-coating of a catalyst composition applied to a surface of each of said at least one strand of said fibrous carrier substrate, said catalyst composition comprising an effective amount of a catalyst having a high activation temperature; and

at least one layer of a solvent-free binder resin composition applied to an outer layer of said at least one layer of said pre-coating, said solvent-free binder resin composition comprising a thermoformable liquid binder resin material having an acid value of less than about 30 mg KOH/g of resin.

29. (Amended) A multi-end roving comprising:

a) one or more strands of a reinforcing fiber material; and

b) one or more strands of a string binder [prepared according to the method of claim 9], said string binder comprising:

~~at least one strand of a fibrous carrier substrate;~~

at least one layer of a solvent-free binder resin composition applied to a each of said at least one strand of said fibrous carrier substrate, said solvent-free resin composition comprising a thermoformable liquid binder resin material having an acid value of less than about 30 mg KOH/g of resin; and

at least one layer of a post-coating of a catalyst composition applied to said outer one of said at least one layer of said solvent-free binder resin composition, said catalyst composition comprising an effective amount of a catalyst having a high activation temperature.